

initiated in January 2003. The work is being accomplished by a combination of ocean certified pipeline dredge and hopper dredge using direct pump-out with material being obtained from the approved offshore borrow areas. A total of 1,819,000 cubic yards will be dredged from the borrow areas and distributed along the 30,600 feet of shoreline associated with Phase 2 of the project with this phase of the project scheduled for completion on 1 April 2003. The design template for Phase 3 of the beach nourishment project calls for 35.2 cubic yards in place per linear foot of beach or a total in place volume of 722,000 cubic yards.

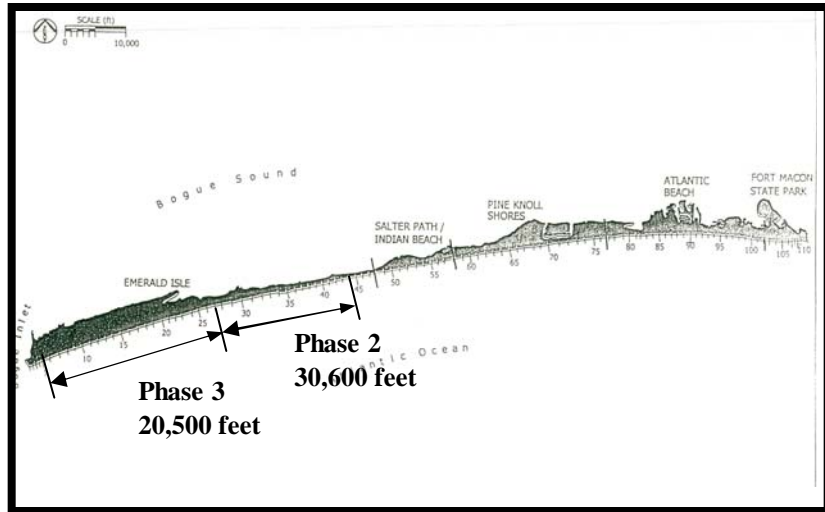


Figure 1.5 Phase 2 & 3 of the Emerald Isle Beach Nourishment Project

1.4. Tides and Tidal Datums. The mean tide range in the Atlantic Ocean in the vicinity of Bogue Inlet is 3.7 feet while the average spring range is 4.3 feet. The primary tidal datum used in this report is the National Geodetic Vertical Datum-1929 (NGVD). The relationship between NGVD and other tidal datums, which may be referenced, are as follows:

Mean Higher High Water (MHHW).....	+2.53 feet NGVD
Mean High Water (MHW).....	+2.21 feet NGVD
Mean Tide Level (MTL).....	+0.35 feet NGVD
NGVD.....	0.00 feet NGVD
Mean Low Water (MLW).....	-1.50 feet NGVD
Mean Lower Low Water (MLLW).....	-1.75 feet NGVD

2.0 PLAN FORMULATION AND DESIGN

2.1. Project Purpose. The primary purpose of the channel relocation project is to create a stable channel that will divert tidal flow away from the Pointe area of Emerald Isle. Therefore, the design focus was on the development of channel dimensions that would capture the majority of the ebb tidal flow through the inlet. Added features of the overall project include closure of the existing channel by constructing a sand dike in the vicinity of the Pointe and nourishment of the west end of Emerald Isle (Phase 3 of the beach nourishment project). Apart from the channel dimensions, the new channel must be position so that it does not cause adverse impacts on the adjacent shorelines or result in unacceptable loss of estuarine habitat.

2.2. Engineering and Geologic Studies. The following sections provide details of the engineering and geologic studies undertaken in support of the project formulation and design. The primary concerns with channel relocation are the impacts on the adjacent shoreline of Bear Island (Hammocks Beach State Park), which lies west of the inlet, and the shoreline on the east end of Bogue Banks (Town of Emerald Isle) as well as possible changes in the configuration of the marsh islands located north of the inlet throat. Accordingly, a detailed geomorphic analysis of the inlet was conducted to document recent changes in the inlet and adjacent shoreline associated with varying channel positions and orientations. The results of the geomorphic analysis was used to select the channel position and alignment as well as predict changes expected to occur in the inlet (including the adjoining marsh areas) and along the adjacent shorelines if the channel is relocated. Geotechnical investigations were conducted within a possible channel corridor to determine the characteristics of the inlet material that would be removed to reposition the channel and determine the compatibility of the inlet material for use as beach nourishment along the west end of Emerald Isle. Engineering studies were undertaken to evaluate the size characteristics of the existing bar channel in order to determine the size of the new channel needed to capture the majority of the flow through the inlet. A hydrodynamic model of the inlet was used to supplement the channel design. The hydrodynamic model was run for the existing conditions of the inlet to establish base conditions for tidal exchange and circulation within the inlet and connecting channels. The proposed new channel was inserted into the model and runs made to develop flow and circulation patterns for comparison with the base (or existing) condition. The hydrodynamic model was also run to assess the need for and impact of closure of the existing channel next to the Pointe. Alternative means of addressing the erosion problem at the Pointe were also evaluated in terms of their potential effectiveness, cost, and acceptability. Finally, an analysis of the possible without project conditions was made to determine the impacts on development at the west end of Emerald Isle should the inlet channel be allowed to continue to migrate to the east and to assess the economic ramifications of the without project alternatives on the local economy should the channel not be relocated.

3.0 GEOMORPHIC ANALYSIS

3.1. Methodology. Contemporary changes in the inlet and along the adjacent oceanfront shorelines (Figure 3.1) were determined through an analysis of a series of representative historic aerial photographs that date from 1973. Twenty-five sets of photographs were initially examined for trends; and on the basis of these observations, 13 sets of aerial photographs covering a large spatial and temporal scale (1973–2001) of Bogue Inlet, adjacent Bogue Banks, Hammocks Beach (Bear Island) and neighboring marshes (Dudley Island) were scanned and orthorectified. An 18,500-foot long baseline was established landward of all digitized shorelines and 37 transect lines were erected perpendicular to the baseline at 500-foot spacings for purposes of measuring and calculating the various shoreline changes (Figure 3.2). A second baseline, also shown on Figure 3.2 (inlet baseline), was established by constructing a line from a stable reference position on Bogue Banks extending across the inlet to Hammocks Beach. The inlet baseline was utilized for purposes of measuring and calculating ebb channel midpoint changes, inlet width along the baseline, and shoulder changes associated with ebb channel migration. The location of the mid-point and axis of the ebb channel were



Figure 3.1 Bogue Inlet Aerial Photograph (9/18/01) Showing Major Features

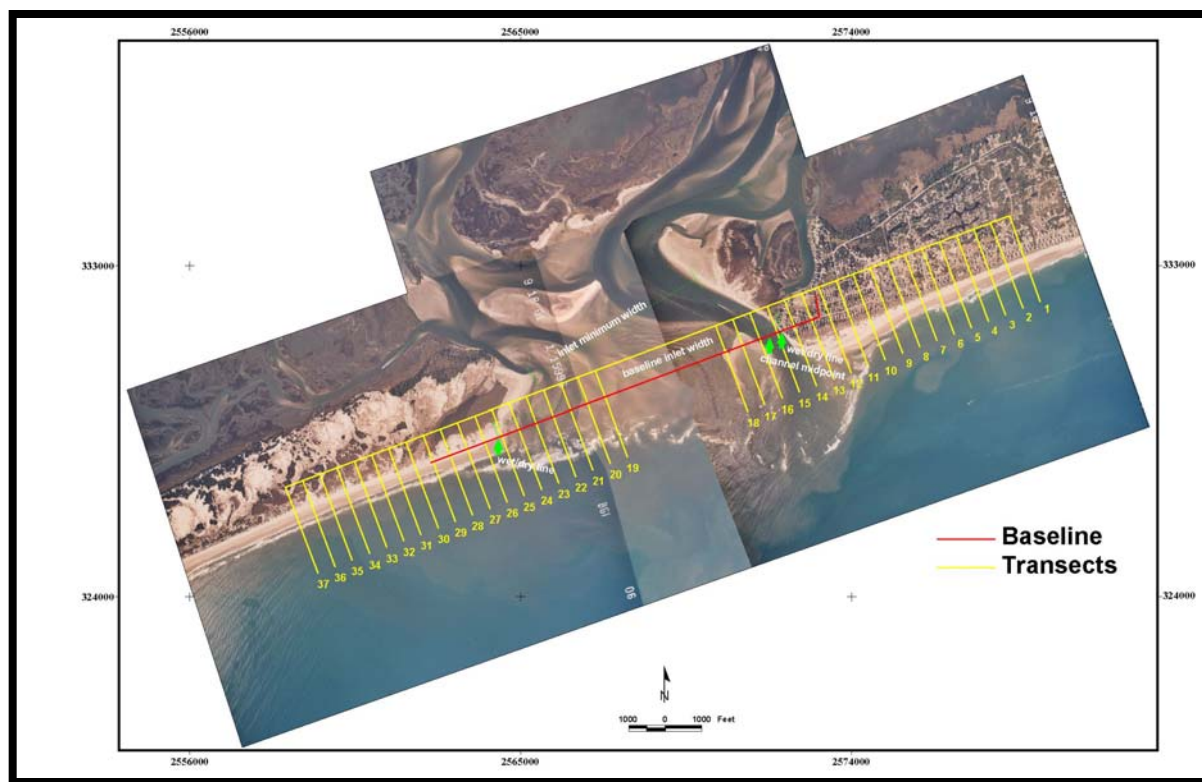


Figure 3.2 Shoreline and Inlet Baselines